declined appreciably during the past five years and is at its lowest point in about 30 years, thanks to the efforts of the New York Police Department (NYPD) and the Transit Authority Police Department (TAPD), which merged with NYPD in April 1995, there is still an unease among passengers in the subway system, particularly at isolated locations or during off-peak hours, that they will be a victim of a criminal assault. For them, token booth clerks, train operators and conductors are seen as visible symbols of security because of their ability to summon help. NYCT's communications system for its buses is a relatively modern, trunked communication system, and bus operators can summon help through a "request to talk", "priority request to talk" or "silent alarm" feature. Because of this radio communications capability, bus operators serve as useful "eyes and ears" when events occur along their routes. The Surface (bus) Command Center can then advise police or other emergency responders of the locale of either a transit or non-transit emergency based upon information provided orally.

With respect to other criminal activities or need for police assistance, it should be noted that approximately one-half million school children use free or reduced fare privileges on NYCT buses and subways to travel to and from school. The after-school travel of large numbers of school children can give rise to special needs for police assistance, much of which is communicated by NYCT personnel through its radio system. So, too, the easy access to public mass transit facilities and their modest cost have, from time-to-time, made those facilities areas where homeless individuals, many of whom are emotionally disturbed, can congregate. These individuals can and do produce requests for police and medical assistance.

In addition to the periodic episodes of "street crime" which occur on subways or buses, mass transit has, within the last few years, been the scene of several criminal acts of considerable proportion. In a multiple slaying in December 1993, an individual opened fire on an LIRR evening commuter train. A little more than one year later, another individual, on two separate occasions, detonated fire bombs on NYCT subway trains producing grievous injuries. While these two latter events are, thankfully, not the type of problems routinely encountered by public mass transit providers, they are indicative of the widespread harm which can result when mass transit is the selected venue of a criminal act. For instance, prosecutors alleged in the firebombing case that the defendant had intended the second firebomb to explode in an underriver tunnel, thus maximizing the devastation and terror and thwarting any meaningful rescue effort since there are no emergency exits in such locations. Had such an event happened during rush hour, multiple trains carrying thousands of passengers could have been imperiled, since NYCT runs as many as 30 trains per hour along some lines during such periods. NYCT employees, such as token booth clerks, have also been the victims of vicious criminal assaults. Their Emergency Booth Communications System is an invaluable lifeline to secure help for themselves or our passengers.

B. Collisions, Derailments, Fires and Accidents

Public mass transit providers strive to perform their functions by the safest means possible and, in large measure, achieve that goal. Notwithstanding these efforts, there have been and doubtlessly will be, accidents or other emergency incidents which can quickly imperil the lives and safety of many people. Collisions and derailments often result in fatalities

and/or multiple serious injuries; they almost always result in a complicated rescue effort which requires coordination among many internal agency departments and personnel, as well as coordination with outside rescue personnel. Fire and smoke conditions are obvious public safety hazards, particularly in the confined environment of a subway. A determination to turn power off may leave passengers stranded in a dark and smoke-filled subway tunnel, with emergency lighting only, without air-conditioning (which would draw smoke into the subway cars) and may affect the ability of the crew to communicate via the public-address sytem. In such an environment, one can envision how quickly panic may set in. Multiple trains may be trapped behind the train closest to the fire, thus impacting, many times over, the number of passengers affected.

1. The Clark Street Fire

This incident typifies the complexity of mass transit operations, the direct impact mass transit providers have on people's lives and the vital role communications capabilities can have on the safety of the public. At an older system, such as NYCT's, there is no automatic train location system -- in other words, the radio system must be used to locate all trains in the vicinity of an incident, to hold back other trains from entering the area, to re-route trains around the danger zone, and to coordinate a plan to rescue the trapped passengers. All of this takes valuable time and must be accomplished at the same time the radio is being used to ascertain from the initial crew member vital information on the nature of the emergency, and updates on the incident, to give instructions to that crew and to coordinate rescue operations. Following below is a summary of the problems encountered when a fatal fire occurred at NYCT's Clark Street Station in Brooklyn in December

1990.[2] In addition to two deaths, more than 200 people were injured. The report underscores the complexities inherent in dealing with a subway fire emergency, the frailties of the existing rapid transit communications system, and the difficulties in coordinating intra- and inter-agency rescue operations.

- Five trains had to be safely moved from the danger area, three of which were in the East River underriver tunnels, with two of those having to be "reverse-railed" to safety, meaning their movement had to be accomplished without the protection of the signal system, and the moves had to be coordinated carefully to insure that there was no collision with an oncoming train.

- Considerable time was spent in locating all trains in the area or about to enter the immediate vicinity and contacting tower operators in order to coordinate the halting of all advancing trains, and the safe movement and safe evacuation of passengers from trains in the immediate vicinity. This needed to be accomplished via voice radio communications with many transmissions needing to be repeated in order to be understood.

- Transmission to the Command Center of the initial reports of a fire/explosion/smoke condition were not acknowledged; tower operators who heard the attempted radio transmission actually telephoned the information to the Command Center.

- The train operator who reported the explosions orally gave his position as being both "north" and "south" of the Clark Street Station, a critical fact since north meant the fire would be located within the underriver tunnel. Some time was lost in pinpointing, via voice communications only, the exact location of this subway train.

- The train which was most endangered had to be reverse-railed to a different station, requiring the train operator to move passengers away from the smoke condition, walk to the end of the multi-car train and move the train into the station to evacuate passengers. In the process of this move, he encountered a

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2 The summary consists of excerpts from a NYCT Board of Inquiry Report on the Fire, which are annexed as Exhibit B.

passenger with a possible cardiac arrest, and relayed that information, via radio, to the Command Center. Upon reaching the reverse end of the train, he reported that emergency brakes had been engaged, which required them to be reset before the train could move.

- Most emergency rescue personnel were dispatched to the Clark Street Station, the site of the initial fire (and evacuation of passengers from one train), while many injured people were on what ultimately proved to be the most endangered train which was reverse-rail moved away from the fire to another station. Additional emergency assistance had to be sent to that station.

- Emergency rescue personnel were also dispatched to the Wall Street station in Manhattan because three trains in the underriver tunnels were moved there to evacuate their passengers, and it was not known the extent to which those passengers may have been exposed to smoke conditions. In addition, the "wrong-rail" moves of two of those trains posed their own dangers and, in the event of a collision, emergency personnel would have been needed at Wall Street.

Many lessons were learned from the Clark Street Fire, and many changes made to improve NYCT's ability to handle a similar situation and to give better information to emergency responders. At the same time, however, there continues to exist real and significant constraints on the ability to obtain "real time" information on developing conditions affecting the safety of our passengers and to pass that information along to rescue personnel, caused in large measure by the limitations of an older radio system. In events such as this, there is a need for coordination among the NYCT Command Center and multiple internal operating personnel (train operators, conductors, tower operators, etc.) and infrastructure personnel responsible for coordinating fan operations (to evacuate smoke) and power distribution (to effect whether power is on or off -- critical both to the safety of rescue personnel and the movement of the endangered passengers). NYCT Command Center must notify various outside emergency responders (Police, Fire, EMS), providing the best information as to the actual conditions they will encounter. While the lack

of interoperability is discussed separately below, the Clark Street Fire rescue effort was hampered by the inability of the older NYCT communications system to enable the Command Center to quickly locate all affected or possibly affected trains and passengers and to obtain reliable updates on conditions as they developed.

2. Other Emergencies/Incidents

From time-to-time, collisions, derailments, track fires and other incidents can arise which threaten the safety of our passengers. Almost always, there is a need to ascertain promptly the nature of the incident, the extent of any injuries and the location of other trains potentially impacted by the unfolding incident. Since one rush hour train may carry one-to-two thousand people, a major disaster can quickly develop. In the case of an incident producing large numbers of less severe injuries, NYCT's bus communications system may be utilized to deploy buses to assist in the evacuation of passengers and transport them to local area hospitals. For smaller-scale medical emergencies (e.g., a passenger with a heart attack), an effective communications system is necessary to summon medical help and arrange for the passenger's safe removal to the hospital. Whether there exists a small-scale or large-scale emergency, public mass transit providers have a clear-cut obligation to do all they can to protect the public entrusted to their care.

C. "Routine" Operational Matters

In addition to the life-threatening emergencies described above, public mass transit providers routinely encounter many operational issues which could themselves develop quite rapidly into a major emergency. One recent example is described here. On May 1st of this year, some debris became

wedged near the third rail at the 51st Street and Lexington Avenue subway station in midtown Manhattan. Electrical arcing occurred which produced considerable smoke and noise which sounded like explosions. Police, Fire and EMS were notified and NYCT personnel were dispatched to the scene. While the cause of the problem was identified and resolved from a maintenance perspective in a little more than one-half hour, the presence of passengers on the roadbed prevented the restoration of power. Since power then had to be turned off for an extended area, many more passengers had to be evacuated from trains stranded in tunnels. Before power could be safely restored in such a situation, personnel must walk the tracks to ensure that no passengers would be endangered, and all rescue personnel must be accounted for. In this instance, the lack of interoperability was a major impediment. The net result was a total suspension of subway service along most of the East Side of Manhattan for more than three hours. In all, passengers from five subway trains were evacuated through subway tunnels. This incident demonstrates that even routine incidents on a mass transit system can have major public safety impacts in a brief period of time.

D. Non-Transit Related Emergencies

Whether it is the World Trade Center Bombing, a water main break which floods the subway signal system, or a loss of electric power in an area of New York City, mass transit must respond immediately and make adjustments in order to safely transport people around or away from the area of danger. On April 23rd of this year, a Con Edison transformer failed near a major downtown Brooklyn subway "hub" station, knocking out the AC power to the signal system on the Manhattan Bridge and in surrounding tunnels leading to the affected Station. Thousands of passengers had to be safely evacuated from

ten stranded trains and many more passengers were re-routed on their homeward journey away from the area. The safe movement of trains on the Bridge and in the tunnels leading to the station needed to be carefully coordinated through voice communications, lest a collision occur, since the protection of the signal system was not there. NYCT, Police, Fire and EMS personnel were all involved in the lengthy, but successful, rescue effort.

Unanticipated events, such as moderate-to-severe snowfalls or a large-scale workplace dismissal in Manhattan, such as occurred immediately after the World Trade Center Bombing, place considerable strains on public mass transit to respond quickly and efficiently. Many NYCT platforms, for example, are narrow and the presence of an unusually large crowd waiting for trains could quickly produce a dangerous condition.

E. Special Events

Public mass transit plays an important role in ensuring that large crowd conditions can be safely managed when major public events occur. The City of New York was one of the stops on the Papal visit to the United States last year. This event was followed a few weeks later by the 50th Anniversary Celebration of the United Nations, which brought many foreign leaders to the City. Frequent visits by the President and other dignitaries can cause local street congestion and other impediments to the typical flow of pedestrians and travelers. Mass transit is invariably seen as the best way to travel during these occasions. NYCT's bus communications system can respond to conditions as they unfold by alerting operators on a "routes affected" basis to diversions which will take their passengers away from congested or potentially dangerous areas. Large scale events require careful coordination among police, other public officials, and mass transit providers to ensure the safety of the public.

The ability to prepare for or respond to all of these events, in large measure, is dependent on communications systems which are reliable and which meet the needs of an entity required to move large numbers of people safely and efficiently.

F. Mass Transit's Role In Regional Emergency Management

Public mass transit can and does serve as a vital resource to evacuate people from areas of danger. Within the last few years, a major storm produced severe localized flooding in oceanfront areas of Brooklyn and Queens. NYCT's bus system was dispatched to evacuate people from areas of danger.

Although it is not a City agency, NYCT serves as a key participant in New York City's Office of Emergency Management, not only because of its need for emergency assistance, but also because of its ability to move large numbers of people quickly from areas of danger. This group participates in periodic emergency drills and meets to review and critique virtually all emergency incidents occurring within the City.

Public mass transit, while perhaps different from Fire, Police and EMS personnel, nevertheless has a substantial, direct, and immediate impact on the public safety. Ordinary human failures in mass transit can have consequences of the deadliest proportion affecting a considerable number of people. Its personnel must respond to the scene, assist in the resolution of the crisis, and work with rescue personnel to ensure the safety of our passengers. Even moderate problems can quickly develop into major emergencies. Public mass transit has a demonstrable need for, and reliance upon, effective voice and data communications systems to perform its mission to serve the community by safely transporting the riders who depend on it daily.

II. Interoperability

As is clear from the discussion above, NYCT relies on the emergency response providers within the City of New York to address emergencies requiring police, fire and medical assistance. The harsh subway environment and the incompatibility of radio systems imposes severe obstacles on the ability of the various agencies to communicate with NYCT, with each other and with their own above-ground personnel. Existing procedures frequently call for firefighters to maintain line-of-sight contact with their own personnel to ensure that rescue workers are not threatened by conditions they encounter in the subway, such as smoke, fire, restoration of power to the third rail, etc. Channels for interoperability are, of course, critical to the public safety, but interoperability alone cannot address limitations inherent in the public agencies' own communications systems. In the examples described in Part I, interoperability would have, indeed, facilitated communications with Police, Fire and EMS command posts. In order to achieve the ultimate objectives, however, NYCT must be capable of using its own communications system to learn quickly the magnitude and location of the events unfolding in order to relay those conditions to the appropriate personnel at the other agencies.

III. Re-Farming

NYCT is acutely aware that frequencies are invaluable assets, and that public safety providers have an obligation to utilize radio spectrum in as efficient a means possible. At the same time, however, there are severe financial constraints on all public entities which will affect their ability to replace or convert costly communications equipment. For that reason, NYCT urges recognition of a continued need for flexibility in meeting timetables

for re-farming. Major capital projects for future communications systems should, of course, be accomplished in a spectrum efficient manner. NYCT is committed to meeting that objective when it expects to replace its rapid transit communications system in the next few years. It would also urge consideration of approaches which might encourage public entities to re-farm as soon as possible. If feasible, public entities should be given latitude to meet their own future communications needs by being permitted to, in essence, re-farm the frequencies first for their own use.

IV. Reliance on Commercial Services

Public mass transit agencies cannot be required to rely on commercial services to meet their needs. In the case of a vast network, such as NYCT's, there is little reason to believe that commercial services would even be interested in providing effective coverage over a network consisting of hundreds of miles of underground track, elevated stations, and far-flung support functions, much less willing to guarantee unimpeded access 24 hours per day. While commercial services might well be a useful adjunct for certain needs, and NYCT, in fact, uses some SMRS services to meet limited stand-alone needs, its overall communications requirements necessary to support a complex transportation system require a detailed and customized approach and substantial investment of capital. Reliance on commercial services is simply not a viable option.

V. Auctioning Radio Spectrum

Public mass transit providers need to be protected from the risk that they will be unable to provide safe transportation because they cannot afford the costs of obtaining radio spectrum to meet their needs. Auctioning spectrum to meet the requirements of governmental agencies is both unwise and unworkable.

Conclusion

NYCT appreciates this opportunity to present its concerns as a public mass transit agency. Specifically, it urges PSWAC to recognize that there are many vital governmental functions which have important impacts on the life, health and safety of the people served. Public mass transit is not only an essential governmental function, it also is intricately and intimately involved in critical public safety duties -- it is entrusted with the safe transportation of millions of people each working day.

EXHIBIT A

Description of NYCT Communications Systems

Summary of Communications Systems

Subway Radio System

NYCT's subway radio system is an older system which is anticipated to be replaced with a new rapid transit operations and command center around the turn of the century. It currently is a "voice only" system and operates in the VHF band with separate frequencies for the IRT, BMT and IND divisions. The Command Center relies on the oral communications from crew members to ascertain the status of incidents, the location of trains, and similar information. As noted in the Safety Board of Inquiry concerning the Clark Street Fire:

> "One of the difficulties faced by Command Center personnel is physically locating trains on the system. The technology being used is dated (circa 1950) and does not provide train occupancy (where trains are located) for 90% of the system. Command Center personnel must rely on towers and direct radio communications to establish train locations. This can be a difficult, time consuming task, that if not quickly accomplished, can have adverse effects on rescue efforts.
>
> "It appears to the Board that an effort to modernize Command Center facilities is required if these kinds of difficulties are to be overcome."

The radio system is largely an inflexible one, with no ability to isolate particular geographical areas in the event of an emergency. It is necessary for a "clear the air" command to be given in many emergency situations, making it impossible for less significant problems to be handled simultaneously by Command Center personnel.

While it is anticipated that some of these deficiencies can be addressed with a major capital investment for a new command center, in order to alleviate the inefficiencies of the existing radio system, additional frequencies will be required to enable the transmission of voice and data and to provide interoperability with emergency first responders.

Bus Radio System

Modernized in the late 1980s at a cost of about $50 million, the bus communications sytem enables a large number of users in all five boroughs to be served by sharing channels in the 800 MHz trunked system. "Talk groups" can be set up and reorganized as needed to address situations. A silent alarm feature can summon help if there is an on-board crime or other emergency. Prior to its implementation, the bus system was dependent upon an antiquated two-way radio system, the problems of which are too many to detail. Parts could not even be found to keep the 30-year old equipment in working order. NYCT struggled to equip its "nighthawk" buses (those operating after midnight) with a working radio to protect the safety of its passengers and bus operators from criminal assaults.

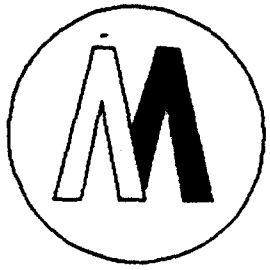
Police Radio System

The inadequacies and limitations of the TAPD radio system during the early 1980s were well-known within both NYCT and the City of New York. Several short-term upgrades were made in the late 1980s and early 1990s to improve the system before a new communications system could be put in place. Funds were committed to improve the cable installed along the right-of-way carrying the voice communications of the TAPD officers. Efforts were undertaken to eliminate dead spots in the system, and other interim solutions were implemented. A significant improvement in the communications functioning of TAPD was the development of a computer aided dispatch system which not only gave the real time status of the TAPD units, but also incorporated the relevant geography of the subway system, including locations of emergency exits. NYCT is in the process of redesigning a major communications

improvement for police personnel on its system. Because TAPD merged into NYPD in April 1995, the original design concept has been revised to reflect NYPD's special needs. As currently envisioned, the above-ground police will not lose their ability to communicate in the below-ground environment of the subway system, and provision for interoperability will be made. NYCT has committed to invest in excess of $100 million to the communications system because it believes that such an improvement will ultimately prove to be for the long-term safety of our customers.

EXHIBIT B

Excerpts From
NYCT Board of Inquiry
Concerning
Clark Street Fire
Which Occurred on
December 28, 1990



NEW YORK CITY TRANSIT AUTHORITY

Board of Inquiry
Clark Street Incident
Final Report

March 7, 1991

EXECUTIVE SUMMARY

At approximately 9:05 A.M. on December 28, 1990, a Manhattan-bound #3 train (the 8:34 A.M. from New Lots Avenue to 148 Street-Lenox) contacted Bowling Green Tower and reported a smoke condition approximately 30 feet south of the Clark Street Station on track #3. Once reported to the tower, the Train Operator was able to depart Clark Street Station and continue on to his final destination. This was the first indication of an incident that would rapidly escalate to a situation requiring a coordinated rescue effort involving the New York City Transit Authority, the New York City Transit Police, the New York City Police Department, the New York City Fire Department, and the New York City Emergency Medical Service.

Approximately three minutes later, a Brooklyn-bound #2 train (the 7:34 A.M. #2 from 238 Street) arrived at the Clark Street Station on track #2. The Train Operator made a normal station stop to discharge passengers, heard an explosion and observed smoke ahead of his train. The Train Operator attempted to report this condition to the NYCTA Rapid Transit Operations Division Command Center by radio, however, this attempt was unsuccessful. The Train Operator's communication was heard by the Tower Operator of the Nevins Street Tower who telephoned the Command Center to alert them that the 7:34 A.M. #2 train was trying to reach them. At this point, approximately 5 minutes after the incident was first recognized, the Command Center communicated with the Train Operator of this #2 train. The Command Center was informed that a heavy smoke condition existed and that the Train Operator was discharging all passengers and securing the train.

It must be noted that the weather conditions that existed at the time of this incident were extremely hazardous. During the evening of December 27-28, 1990, a storm had dropped 6.6 inches of snow on the City which contributed to traffic congestion in downtown Brooklyn and the ability of emergency units to respond to the situation as rapidly as they otherwise could have.

At 9:11 A.M. the Command Center contacted the Chambers and Nevins Street Towers and instructed them to prevent additional trains from entering the incident area. At 9:12 A.M. the Command Center reported over the "6-wire" (a NYCTA interdepartmental intercom system) that a fire and subsequent explosions were reported between Clark Street and Borough Hall Stations. Additionally, during this time frame the NYC Transit Police were dispatching two of their Emergency Medical Rescue Units (EMRU) to the scene. At 9:13 A.M. Command Center informed the New York City Fire Department of the situation and within six (6) minutes units began arriving at the scene (Clark St.).

Within the same period of time a Manhattan-bound #3 train (the 8:42 A.M. train from New Lots Avenue to 148th Street-Lenox) also reported an explosion and smoke from what appeared to be an electrical fire to the Command Center. The Train Operator indicated that the fire was in front of his train just south of the Clark Street Station. He also indicated that he was going to hold his train in the tube, approximately 150 feet south of the fire location.

After becoming aware of the situation at the Clark Street Station, the Authority's Command Center activated its internal emergency notification procedures for New York City Transit Authority Divisions and Departments, and external notification procedures for New York City response agencies. Initial notification to all agencies, except for Emergency Medical Services was completed at 9:12 A.M. At 9:14 A.M., the Transit Police contacted a 911 operator and requested that the New York City Police Department and Emergency Medical Service respond to the incident. At 9:15 A.M., the 911 operator contacted the Emergency Medical Service and requested that units be dispatched. An Emergency Medical Service Basic Life Support Unit reported to Clark Street at 9:28 A.M.

Subsequent to the emergency notification process, the Command Center became deeply involved in locating trains in the vicinity of the Clark Street Station in order to develop plans for their removal from the situation. Essentially five trains were involved: a Brooklyn-bound train that had discharged its passengers and was standing in the station; two other Brooklyn-bound trains that were in the underriver tube between Manhattan and Brooklyn; a Manhattan-bound train standing in Borough Hall; and the Manhattan-bound 8:42 A.M. #3 New Lots train that was standing 150 feet south of the Clark Street Station that, in retrospect, was the only train in immediate danger during the course of the incident. While the Command Center was involved in the process of locating the respective trains, the situation with respect to the 8:42 A.M. #3 New Lots train continued to deteriorate. The Train Operator concluded that, in view of the ongoing explosions and the smoke that was beginning to infiltrate into the cars, he should move his passengers to the rear of the train.

By 9:24 A.M., the Command Center had decided to move the 8:42 A.M. #3 New Lots train back to Borough Hall Station. The ability to do so was contingent upon the Train Operator moving to the south end of his train and for the train standing in Borough Hall to be moved out of the station so that the 8:42 A.M. could enter the station.

The train was ready to move at 9:37 A.M. but could not be moved because someone had activated the emergency brake valves in two cars. By 9:41 A.M. this condition had been corrected and the train began its move back to Borough Hall at 9:42 A.M. Three minutes later, at 9:45 A.M. the train entered Borough Hall Station and stopped with five cars in the station.

As a result of this incident 200 people claimed to have been injured due to smoke inhalation. 128 passengers were removed to local hospitals using NYCTA buses where they were treated and released. One passenger died on the train. Another passenger was removed to a local hospital where she subsequently died.

On December 31, 1990, Executive Vice President, New York City Transit Authority, directed that a Board of Inquiry be convened to investigate the circumstances surrounding the incident and to prepare recommendations whose implementation should reduce the likelihood for the recurrence of a similar incident.

The Board determined that the primary cause of the incident was the failure to replace concrete removed from the tunnel wall during the installation of third rail transposition cables. Contributing to the incident was the introduction of wet snow into a normally dry, steel dust contaminated environment that permitted the development of an electrical path to an exposed section of the metal tunnel liner.

The primary cause of passenger injuries was the duration of exposure to the dense smoke that was generated as a combustion by-product of the electrical cable insulation and conduit.

The Board also reached numerous conclusions with respect to: the effect that fan operations may have had on the smoke; the effect the snow had on the incident; the method selected to extricate the passengers from the incident scene; the performance of the train's crew and the Command Center; and, finally, the effectiveness of the liaison between the New York City Transit Authority, and the Transit Police Department, New York City Police Department, New York City Fire Department and Emergency Medical Service.

- o Fan Operations: The fans for the underriver tubes were designed to provide a flow of fresh air into the faces of passengers being evacuated on the roadbed, from trains that had become disabled in the tube or to blow smoke away from the passengers. The smoke being generated in the incident was not within the tube. The Furman Street fans had not been operational since 1984 and the Johnson Street fan operates in the exhaust mode only. Since the Johnson Street fan was behind the 8:42 A.M. #3 New Lots train, its operation would have drawn smoke past the train toward Borough Hall, an undesirable action. With respect to fan operation, the Board concluded that the location of the fans in relation to the station and the trains in the vicinity would have rendered their utility questionable. The Board concluded, with the information available to it, that not turning on the fans at Johnson Street until after the passengers were discharged was a correct decision.

- o Effect of Snow: Snow had fallen overnight and was carried into the subway system on the roofs of trains that had been stored out-of-doors. It was then dislodged by cross drafts at the incident site and deposited on the roadbed approximately 30 feet south of Clark Street Station, thereby changing a historically "dry" location to one that was covered by heavy, wet snow and water. This wet condition was made worse by an inoperative track drainage system.

- o Method to Extricate Passengers: The Command Center had several options with respect to removing passengers from the smoke filled environment. Among those were to evacuate the passengers on foot either to the roadbed or to the benchwalk; to move the train through the arcing condition into the Clark Street Station; to move the train back to Borough Hall; or, to use a reach train. The thought of evacuating a thousand passengers to the roadbed or a benchwalk in

dense, choking smoke, without considerable assistance and under poor lighting conditions is a daunting one at best. It is also an uphill climb from Clark Street to Borough Hall. The track has an invert that poses a considerable tripping hazard. Trying to walk on a narrow benchwalk would have also been difficult. The potential for more casualties due to overexertion cannot be over-looked. Although the train could have potentially been moved through the fire and into the Clark Street Station, this would not have been a prudent decision, as it would have exposed the passengers to the smoke/fire/explosions at close range. There was also a risk that the train might has stalled immediately adjacent to the fire site.

The decision to move the 8:42 A.M. #3 New Lots train back to Borough Hall was the correct decision with respect to passenger safety.

- o **Performance of Command Center:** The performance of the Command Center played a key role in this incident. Inasmuch as the Command Center is responsible for notifying all personnel within the Authority, and those from outside agencies as well, regarding the occurrence of such incidents and coordinating all related internal emergency response activities, they have a greater effect on the successful handling of an incident than any other internal or external function.

  With respect to initial notifications the Command Center performed adequately in that it notified internal Authority divisions and police and fire agencies in a timely manner. However, the lack of a timely notification to Emergency Medical Services, as well as to status report updates regarding the location of the stranded train and the environmental conditions they were in significantly impaired a timely and effective response on the part of Emergency Services personnel to treat passenger casualties at the Borough Hall Station.

  However, it is clear that the Command Center's focus of attention during this incident was on the trains stranded in the underwater tube rather than on the one located closest to the fire. The lack of timely follow-up communication with the train closest to the fire resulted in the Command Center not fully understanding the seriousness of the situation on that train. As a result, although they were expeditiously taking action to bring the trains in the Clark Street tube back into the Wall Street Station, this activity did not place a high-enough emphasis on moving the train that was in the most danger. This resulted in some delay, in minutes, in having the train brought back into the station at Borough Hall where emergency evacuation and rescue efforts could begin. This had a critical effect on the overall incident.

- o **Delay in the Wrong Rail Move**: At 9:15 A.M. the Train Operator of the 8:42 A.M. #3 NLT was granted permission by the Command Center to move his passengers to the rear of the train. It was not until 9:42 A.M., however, that the Train Operator was ready and able to move the train back to Borough Hall. While the decision to move the train back to Borough Hall was correct, the delay in affecting the move was the problem. Factors interfering with the ability of the Train Operator to accomplish this sooner included: 1) difficulties walking 450 feet (nine cars) through the crowded train at the same time that passengers were moving through the train (concentrating in cars toward the rear of the train); 2) emergency brake valves that had been activated and had to be reset; 3) the collapse of a passenger in the third car; and 4) possible delays communicating with the Command Center because of an incorrect switch setting.

This final report of the Board of Inquiry presents the findings developed during the Board's investigation; a discussion and analysis of all factors related to the incident; and interviews with various personnel involved in the incident. Also included are the Board's conclusions as to what caused or contributed to the fire and related injuries; and the Board's recommendations with respect to actions that should be taken to reduce the likelihood of the recurrence of a similar incident.

2. Mechanical Effect of the Snow

As previously stated, the Clark Street Station had been regarded as a "dry location". The addition of the snow, which came from the tops of passing subway cars that had been stored out of doors, created an unusual wet condition. The snow that fell from the passing subway cars was wet and heavy.

3. Possibility of Cable Rubbing Against the Tube Liner

The transposition cables at this location have been there since approximately 1971. Due to lack of space between the third rail and the tunnel's benchwall, concrete was removed to accommodate the cable's installation. When the concrete was removed, a section of the metal tunnel liner was exposed. Upon completion of the installation in the early seventies, the transposition cables may have been very close to the tunnel liner. As part of Track and Structures' maintenance program, these cables were inspected twice a year and there were no reports of worn insulation of these cables.

4. Damming of Melted Snow

Due to the fact that the Clark Street Station is considered to be a normally dry location, the drains are not routinely checked or inspected. They are cleaned when they are reported to be blocked and water is standing on the track's invert. Without periodic inspection, the only way to verify that a drain is not functioning is for water to be backed-up and a report generated. Given the depth and weight of the snow and the lack of drainage in the area, it would have been possible for the water level to have risen to a point where contact with the third rail was made. When contaminated by steel dust and dirt, the snow and water could have served as a weak electrolyte, thereby creating a leakage path to the exposed tube liner.

5. Third Rail Lighting Taps

It is common practice to install third rail taps to bring third rail power into a station or for use at work locations on the roadbed. These taps are generally made up of #6 gauge wire. At Clark Street, in the immediate vicinity of the transposition cables, a third rail tap had been installed. The tap at Clark Street was reported to have been in a state of good repair.

The tap was attached to the gauge side of the third rail with a #6 gauge wire that passed under the third rail and up to the fuse box. A second cable was strung from the fuse box to the location where the power is needed.

E. EMERGENCY COMMUNICATIONS

1. Intra-agency

T/Os experienced difficulty contacting the Command Center initially. Tower operators had difficulty contacting the Command Center over the radio until telephone contact had been established. Thereafter, radio communications improved. Six (6) wire communications with Stations, Transit Police and Track and Structures were normal. The Transit

Police monitored the 6-wire as well as normal communications with their Emergency Medical Response Units and responding Police Officers. The Track and Structures, Electrical, and Stations Division monitored and responded to the 6-wire announcement of the smoke/fire condition at Clark Street.

2. Inter-agency

The Brooklyn Fire Dispatcher (#304) was notified to have units respond to Clark Street at 9:13 A.M. The Transit Police Communications Unit contacted 911 at 9:14 A.M. (Operator #779) and requested that the New York City Police Department and EMS respond. At 9:15 A.M., the NYPD contacted the EMS and requested that EMS respond to the scene (EMS Operator #967).

3. Communication Discipline

Throughout the incident, the 12-1 (clear the air) code was called for by train operators and the C/C. A review of the RTO transcripts revealed that train operators and supervision failed to adhere to the code's meaning.

4. Train Radios

Until recently, the only method of communication available between the train and the Command Center or Towers was the T/O's (20-watt) radio. This radio is capable of operation only when placed in its bracket in the T/O cab. In 1990, all Conductors (C/R) were given hand-held, (6-watt) portable radios that have the capability of transmitting and receiving to the C/C, Towers and/or to other trains. These units are battery-powered and do not have to be installed in brackets. The C/R's radio has a two-position toggle switch that is used to select train-to-train (T) or train-to-Command Center (C) frequencies.

The "C" position on the C/R's radio enables the C/R to transmit to the Command Center on frequency 161.190 MHz and receive on frequency 158.880 MHz (train-to-train). The "T" position enables the C/R to transmit and receive on frequency 158.880 MHz thus not allowing transmission between trains to be heard by the C/C.

The C/R can hear Command Center transmissions regardless of the toggle switch's position.

F. FANS

1. Fan Status

There are three (3) fan plants located in the vicinity of the Clark Street Station and the underriver tubes. These are the Old Slip Fan Plant (#7229), located 1,100 feet south of Wall Street (Manhattan); the Johnson Street Fan Plant (#7231), which is located 450 feet north of Borough Hall (Brooklyn) at Station #284+00; and the Furman Street Fan Plant (#7230) located 860 feet north of Clark Street (Brooklyn) at Station #260+40. At the time of the Clark Street incident, the Old Slip fan plant (2 fans) and the Johnson Street fan plant (1 fan) were in service. The Furman Street fan plant (4 fans) was under construction. The Furman Street fan plant has been out-of-service since August 30, 1984. It is anticipated that it will be returned to service by March 31, 1992 (see Appendix D).